

## ***Invasive Species and Areawide Pest Management: What We Have Learned***

Farmers and land managers have always had to deal with unwanted weeds, plant pathogens, and insect pests. But improvements in transportation and trade have made it easier for both desirable goods and undesirable pests to move across regional and national boundaries.

The Invasive Species Council, established in 1999 by Presidential Executive Order 13112, defines an invasive species as any plant, animal, or organism that is not native to the ecosystem under consideration and whose introduction is likely to cause harm to human health, the environment, or the economy. ARS has been a full partner in this council, helping to develop an Invasive Species Management Plan. This plan recommends specific objectives and measures for coordinating a federal response to the order.

With hundreds of invasive species costing Americans well over \$100 billion annually, there is no question that this issue is a national priority. Invasives include not just recent introductions like glassy-winged sharpshooters, but centuries-old nemeses like codling moths, which invaded our shores early in the 1800s and have caused significant problems ever since.

ARS conducts research in extremely diverse areas involving prevention, control, and management of invasive species. This research includes, but is not limited to, reducing the rate of introduction of invasive species and rapidly detecting, identifying, and developing technology to eradicate newly emerging pests. ARS also conducts extensive research on the long-term management of established invasive species, emphasizing biologically based integrated pest management (IPM) activities, including the areawide projects described in this issue of *Agricultural Research*.

ARS' areawide pest management demonstration programs have shown that dealing with pests in small areas is not nearly as effective as blanketing a large area with control strategies. Each tool developed or piece of knowledge gained helps, but synergistic good can come from pulling all the pieces together over a large area. And cooperation between researchers across disciplines and institutions—especially incorporating public education resources through the State Agricultural Experiment Stations and extension facilities—is crucial to turning research results into field successes.

Partnering with other federal agencies, farmers and ranchers, and private-sector entities (for example, consultants, industry, environmental groups) is also essential.

Areawide pest management has been used effectively many times. Eradicating screwworms was among the first and most noteworthy successes with such an approach. Former ARS

scientists Edward F. Knipling and Raymond C. Bushland showed that it was possible to eliminate the pest from a region by releasing sterile male flies and conducting comprehensive monitoring.

ARS researchers have participated in many other multi-organization pest management programs, directed against insects such as ticks, silverleaf whitefly, pink bollworm, and boll weevil. A new project funded by a grant from the Initiative for Future Agriculture and Food Systems addresses three weeds at once through an ecosystem approach.

But a large-scale approach is still the exception rather than the rule. Social, political, and economic factors must come together with science before an areawide program can succeed. In addition, scientific challenges include defining the appropriate geographic area, selecting the control approaches to test and combine, and addressing the different life cycles of the target pest as well as secondary pests.

No one agency or institution can tackle these problems alone.

In 1994, ARS formalized a mechanism for increasing the number of pest problems addressed by areawide efforts and focusing on environmentally friendly approaches. So far, projects to control codling moths, insects in stored grain, and corn rootworms have decreased pest insect populations and amounts of pesticides applied. Newly launched, or soon-to-be-launched, projects address fruit flies, fire ants, lygus bugs, Russian wheat aphids, greenbugs, and the melaleuca tree.

We're also still contributing scientific knowledge toward controlling invasive pests that either haven't reached the stage where an areawide program is feasible or where another agency is taking the lead. Stories in this issue of the magazine cover such efforts on several water weeds and the glassy-winged sharpshooter.

The goal of these projects is not just to reduce the pests, but also to enhance cooperation between the myriad organizations and individuals affected by the pests. Many of our pest control programs address issues over many disciplines and environments, but the areawide programs give us specific opportunities to promote IPM and establish wide-ranging partnerships to transfer scientific results to users.

For that reason, the General Accounting Office has said that these programs should be models for demonstrating the economic, social, and environmental benefits of IPM. Each project, in addition to the large-scale demonstration sites, includes assessment and education. When we run into problems, the research component helps us find solutions.

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